

WHAT IS CLAIMED IS:

1. A force generator comprising:

a circular rotational force input member and an end plate connected together by a plurality of cage shafts forming a carrier cage having a longitudinal centerline,

5 a fixed longitudinal carrier shaft positioned along the longitudinal centerline of the carrier cage, the carrier cage being rotatably mounted to the carrier shaft,

at least one internal force generating unit mounted to the carrier cage for rotation around the carrier shaft,

10 the carrier cage being capable of rotational movement in response to a rotational force applied to the input member,

the internal force generating unit being mounted between a proximal mounting plate and a distal mounting plate, the mounting plates being affixed to the cage shafts and rotatable on the carrier shaft,

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each internal force generating unit having a sun gear locked to the carrier shaft adjacent one of the mounting plates, first and second planet gears engaging the sun gear and respectively mounted in rotational relationship to one of the mounting plates, first and second crank throw units, a first crank throw unit mounted to the first planet gear and a second crank throw unit mounted to the second planet gear,

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a third crank throw unit rotationally mounted to the other of said mounting plates and a fourth crank throw unit rotationally mounted to the other of said mounting plates,

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an eccentric being mounted between the first and third crank throws and being freely rotatable about a wrist pin interconnecting the first and second crank throws, and

a second eccentric being mounted between the second and fourth crank throws and being freely rotatable about a wrist pin interconnecting the second and fourth crank throws.

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2. A force generator as claimed in Claim 1, wherein multiple internal force generating units are mounted to the carrier cage.

3. A force generator as claimed in Claim 2, wherein the centerline of the carrier shaft and a centerline passing through each wrist pin of an individual force generating unit lie in a common plane.

4. A force generator as claimed in Claim 3, wherein the common planes of respective individual force generating units are offset 45 angular degrees from adjacent individual force generating units.

5. A force generator as claimed in Claim 4 further comprising a timing mechanism connected to the carrier shaft to change the phase relationship between the carrier shaft and the carrier cage to angularly vary the resultant force output.

6. A force generator as claimed in Claim 2, wherein the internal force generating units are juxtaposed end to end.

7. A force generator as claimed in Claim 3, wherein the internal force generating units are juxtaposed end to end.

8. A force generator as claimed in Claim 7, wherein there are four internal force generating units grouped in one set with the common plane of each generating unit of the set being angularly disposed  $45^\circ$  with respect to the common plane of any adjacent generating unit.